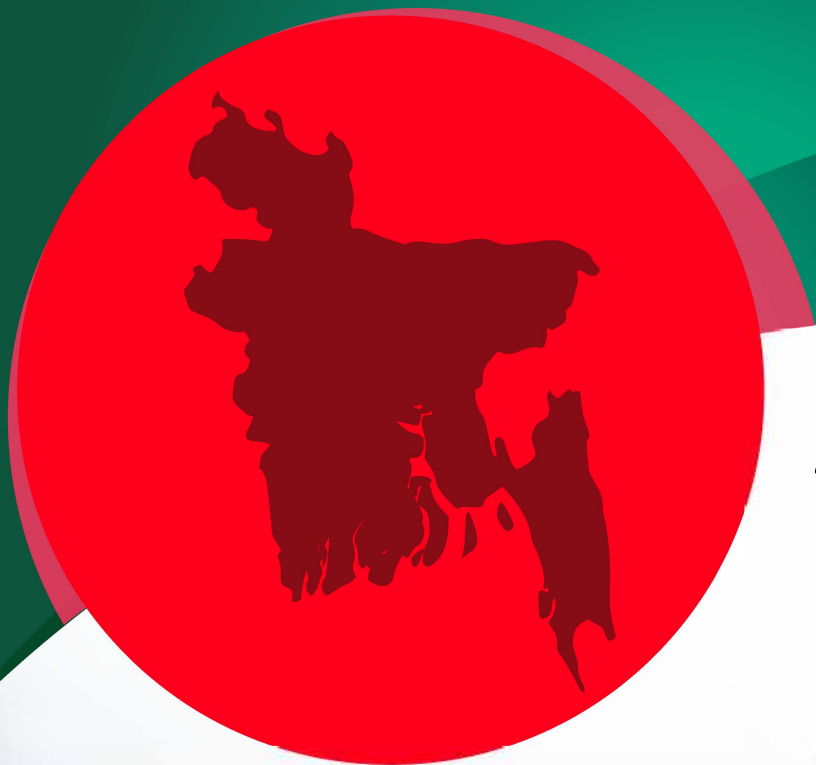


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HOMESTEAD GARDENING IN BANGLADESH: ENHANCING THE NUTRITIONAL AND ECONOMIC STATUS OF THE RURAL POPULATION

S.A.Kamal Uddin Khan

ABSTRACT

In Bangladesh about 75% of the households have a homestead garden; yet a majority of them depend on the market for their vegetables. The size of the home gardens in Bangladesh is similar, ranging from 1.0 to 1.5 decimals and the varieties of vegetables grown in the gardens range from 1.4 in Teknaf to 3 in Dumuria. The average monthly vegetable production per household ranges from 0.3 kg in Madaripur Sadar to 8.6 kg in Sripur. The per capita vegetable consumption by household members ranges from 69 gm/day in Madaripur Sadar to 112 gm/day in Dumuria. A majority of the farmers use their own stock as a source of seeds and seedlings for gardening. The cultivated vegetables in a home garden can give an economic return of Tk. 1776 per year, where the input cost is only Tk. 470. It also gives a yearly return of 611.3 kcal, 4133.8 mg vitamin “A” and 323.2 mg of vitamin “C” along with other nutrients in considerable amounts.

Introduction

Nutrient deficiency is a common problem among most of the people in Bangladesh, especially among those living in the villages. About 30 thousand children become blind every year due to vitamin “A” deficiency in their daily diet (Anonymous, 1993a). Due to poverty, illiteracy and lack of knowledge about food and nutrition, many farmers suffer from malnutrition, which especially affects newly married, pregnant, or lactating women. On the other hand, most households in the villages occupy some land surrounding their home, where they can easily establish a homestead garden to supplement their nutritional requirements. These gardens involve “deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and, invariably, livestock, within the compounds of individual houses, the whole crop-tree-animal unit being intensively managed by family labour”. These gardens often feature low capital inputs and simple technology (Fernandes and Nair, 1986).

Scientists and development agents often ignore home gardens as an important part of the traditional farming system due to their small size and apparent insignificance (Bunderson *et al.*, 1990). But every farm unit should be considered as a specialized entity in itself because the farmers who practice homestead gardening are guided, perhaps in the absence of a unified set of expert recommendations, by their own perception and conviction about species selection, admixture and management. Many studies have reported the existence of home gardens in various regions of the world, but very few studies have adequately analyzed the structure, species composition, diversity and management aspects of

the home gardens (Millat-e-Mustafa *et al.*, 1996). In Bangladesh there is only scattered information regarding nutrition gardening in homesteads. This study was designed to accumulate the available information on nutrition gardening in homesteads of Bangladesh and their significance in providing year-round food security and nutritional benefits for the poor farmers.

Present Status of Homestead Gardening in Bangladesh

Home gardens are well-established land use systems in Bangladesh where different crops, including trees, are grown in combination with livestock and fish. Most of the home gardens are rectangular in shape, built on mounds to raise them above the water level during the annual floods, and usually fenced by trees or shrubs. A typical home garden serves several houses in a cluster and has space for vegetable gardens, a yard for threshing and communal activities, cattle sheds, ponds, trees, shrubs and bamboo. The most frequently harvested plants are generally grown in the back yard, at the pond side, and around the cow shed for the provision of fruit/food, fuelwood, timber and fodder both for domestic use as well as for cash (Millat-e-Mustafa *et al.*, 2000).

Home gardens are more reliable from the physical and socio-economic points of view and are important sources of income for the farmers of Bangladesh. The poor farmers are often forced to sell cropland to stave off poverty, but they tend to retain the home gardens unless absolutely unavoidable. According to the statistics (Anonymous, 1998a), there are 162,229 holdings that have no homestead land and 5,003,042 holdings have only homestead land but no

cultivable land (Table 1). It was observed that the landless farmers have their own home gardens where they grow essential commodities for their subsistence (Abedin and Quddus, 1990).

It was also found that approximately 75% of all the households in Bangladesh have a homestead garden (Anonymous, 1998b). The proportion of households without a home garden was highest in Teknaf (56%) and Sripur (49%) and the proportion of households practicing traditional gardening ranged from 38% in Teknaf to 76% in Madaripur. Household gardens were classified as traditional, improved, and developed. Traditional gardens are scattered, seasonal, and only have gourd-type vegetables, which are common in rural Bangladesh. Improved gardens are those that have more than gourd-type vegetables but are not in production throughout the year. Developed gardens produce vegetables throughout the year, have gourd and other varieties of vegetables, and are on fixed plots of land.

Characteristics of Existing Home Gardens in Bangladesh

Home gardens in Bangladesh comprise different plants, vegetables and fruit plants along with domestic animals and poultry. The Farm Division of Bangladesh Agricultural Research Institute (Anonymous, 1993a) formulated a standard format for home gardens used for vegetable growing. They divided the garden into five splits and arranged different vegetable crops as follows.

- First split: Radish/Tomato–Red Amaranth–Red Amaranth–Indian Spinach
- Second split: Red Amaranth+Brinjal–Red Amaranth–Okra
- Third split: Spinach – Garlic/Red Amaranth – Amaranth – Red Amaranth
- Fourth split: Kale/Collard–Onion or Carrot–Swamp Cabbage–Red Amaranth
- Fifth split: Cabbage–Red Amaranth–Bitter Gourd–Red Amaranth

Surrounding the garden, the farmers use fencing as climber for climbing-type plants. Live fencing is also practiced with *Colocasia* sp. or short-lived fruit plants like papaya.

In a survey it was found that the size of the home gardens was similar in the survey area ranging from 1.0 to 1.5 decimals (Anonymous, 1998b). The different varieties of vegetables in the garden ranged from 1.4 in Teknaf to 3 in Dumuria Sadar. Approximately 90% of the households produce at

least one variety of vitamin A rich vegetable in the garden. The average monthly vegetable production per household ranges from 0.3 kg in Madaripur Sadar to 8.6 kg in Sripur. Per capita vegetable consumption by the household members ranges from 69 gms/day in Madaripur Sadar to 112 gms/day in Dumuria. On average, children consume one of eight common vegetables only 1.2–2.2 times per week (Table 2).

There is a clear sharing of tasks between women and men for the management of home gardens. Hossain *et al.* (1988) reported that in Bangladesh women are mostly involved in the pre- and post-harvest work of vegetable production while men play a key role in growing timber and fruit trees.

For the cultivation of vegetables in home gardens the farmers collect their seeds and seedlings from different sources. Gardeners using their own stock as a source of seeds/seedlings was high in Mohammadpur (70%) and Teknaf (81%), moderate in Sripur (54%), Dumuria (41%) and Tetulia (42%) and low in Madaripur Sadar (20%) (Anonymous, 1998b). The main source of seed in Madaripur was from others (41.8%) (Table 3). It was found that different Non Government Organizations like Co-operative American Relief Everywhere (CARE) International, Bangladesh Rural Advancement Committee (BRAC) and Proshika distribute seeds and seedlings as a part of their flood rehabilitation program. A large percentage of households in Mohammadpur, Sripur and Dumuria also reported getting seeds and seedlings from neighbors.

Production and Income from Home Gardens

Primarily, homestead gardens are the source of supplementary food for a family. Here capital input is low, simple techniques are applied and the family members themselves participate as labor. The cultivated vegetables can also give an economic return when there is a surplus. When livestock is reared in the homestead, it also becomes an important source of economic return. A number of urban and rural households raise and sell livestock and produce different items as an enterprise. Livestock, poultry, and milk and milk products produced in rural and urban homesteads are comparable, but significant differences prevail between rural and urban homesteads regarding production of meat, eggs, hides and skins and bones, hoofs, horns, hairs, etc. (Table 4). From a home garden a farmer can produce 233.5 kg vegetables, 32 items of gourd and sweet gourd, and 104 drumsticks with an expenditure of Tk. 470.00 only a net return of Tk. 1,776.00 per year (Table 5).

Nutrition Supply from Home Gardens

Vegetables are produced in the home gardens in different seasons. Hence, the availability of different nutrients varies from season to season. Table 6 indicates the approximate amount of nutrients from a home garden during different periods of the year. A total of 611.30 calories, 778.5 mg Calcium, 814.2 mg Phosphorus, 46.65 g Iron, 4133.8 µg Vitamin 'A', 1.04 mg Thiamin, 1.10 mg riboflavin, 6.89 mg Niacin and 323.2 mg Vitamin C can be obtained in a year. Significant amounts of Vitamin A and Vitamin C are being supplemented from home gardens to meet the daily requirement of the nutrients for an adult (Table 7).

Conclusion and Recommendations

In Bangladesh, home gardens supplement the nutrient requirements for a farmer's family without negatively affecting the resource base. Moreover this practice improves the resources of poor farmers and also meets several socio-economic and ecological conditions which contribute to their better living and sustainability. Low input cost, stable yield every year, application of simple technology, and intensive management practices by the family members are the main features of homestead gardens in Bangladesh. Proper care is necessary for the development of the home gardens to face the challenges in the new millennium. Attention to the following recommendations could enable home gardeners to play a vital role in Bangladesh. The proper nurturing of home gardens has remained ignored or little explored in research activities. The issues include appropriate choice of species and different components of home gardens. These issues need to be urgently addressed, especially in the context of major challenges facing the forestry sector in the new millennium, such as deforestation (rate of deforestation is 8 ha per year), land shortage, rapid population growth (2.17% growth rate per annum), degradation of soil and water resources, deregulation of indigenous knowledge and traditional resource use practices.

Plant and animal diversity of the home gardens is an important factor for sustainability. Factors affecting plant and animal diversity and the importance of diversity of Bangladesh home gardens are rarely explored. Many diversity indices (e.g. Shannon's index, Mergalef's index) of home garden plants and animals could be determined to understand a definable characteristic of the home gardens in Bangladesh. Hence, research is warranted in this area.

Forest-like multi-level canopy structure is the common feature of the home gardens of Bangladesh and includes plants creeping on the ground (e.g., sweet potatoes) and tall trees of 10 m or more (such as coconut palms). Research and documentation on this vertical stratification of home gardens with respect to species density, diversity, function and schematic presentation of different strata are scant and need special research attention to describe and simplify organization of complex home garden vegetation types.

Interactions among the components in a home garden are important in terms of environmental impact. Thus more studies and research on interaction among different components in a home garden are needed to understand the sustainability of the system.

Cycling and recycling of nutrients in home gardens of Bangladesh remain unexplored and could be crucial for the sustainability of the system. Research in this field will also indicate ways of increasing the productivity of the home gardens.

Farmers themselves are researchers and continuously conduct informal experiments to assess their ideas, beliefs and hypotheses. Therefore, indigenous knowledge of home garden management provides a valuable information base. Such indigenous knowledge could assist policy makers, planners, government officials, non-government organizations (NGOs), development practitioners, and researchers in making plans for sustainable development of home gardens.

Systematic investigation should be done on the innovative techniques used by the farmers in their home gardens to improve the productivity of the fruit trees and girth of the trees because such practices have great potential to increase the efficacy and efficiency of home garden production.

In Bangladesh, no attempt has so far been made to quantify the inputs (e.g. cash, labor etc.) and outputs (e.g. goods and services available) involved in the home gardens. Information regarding annual growth rate of important species and harvesting rate from the home gardens is needed to evaluate the role of this system with other modern production systems and to assess the sustainability of the system.

Identification of fruit plants in the home gardens with special characteristics will ensure genetic potentiality to establish an *in situ* gene bank. The productivity of already existing poor quality and poorly yielding fruit

trees could also be increased by special horticultural technologies such as tree renovation.

In Bangladesh, there is a great demand for silk and lac and home gardens have great potential in promoting such practices. Mulberry (*Morus alba*) is a very hardy and versatile tree and grows well under a wide range of agro-climate and soil conditions. It could be introduced in home gardens for sericulture. Ber (*Zizyphus mauritiana*) is a multipurpose fruit tree commonly found in all regions. Its number could be increased in home gardens for lac culture.

Women and children contribute a significant proportion of labor for home garden management. Women are more knowledgeable than men in many aspects of home garden management, but the family does not recognize their role and their access to various resources is limited. Giving due respect to their indigenous knowledge and encouraging them in more home garden activities, low interest credit facilities should be provided to them by the government and NGOs, so that besides managing home gardens they can invest in income-generating activities from home gardens.

Training and extension support should be provided for women by Village Women's Association to familiarize them with innovative technologies, so that they can improve the productivity of the home gardens. Extension services should be strengthened to provide technological support to the farmers also. The farmers should be encouraged to adopt improved yet affordable technologies.

Proper motivation and approaches are necessary to change the traditional home garden practices and weakness to some selected crops to grow for cultivation in their home gardens. Department of Agricultural Extension (DAE), government dealers and different NGOs can take effective initiatives to provide seeds and seedlings of improved varieties of vegetables and supply fertilizers duly. For year-round nutrient supply and better living, home garden practices should be popularized and the unemployed urban and rural young encouraged to take it as a career.

Conducting training programs for farmers on proper care and disease management of cultivated crops can ensure successful production and better return from home gardening. Incorporation of domestic animals and poultry will provide more protein supplement and greater economic return. High yielding breeds of domestic livestock should be made available at low

cost to the farmers through Department of the Livestock and different NGOs.

An important component of homestead farming systems is livestock; used for draught power and milk, these animals face an acute shortage of fodder. This situation could be overcome by introducing multipurpose tree species in the home gardens (e.g. *Acacia auriculiformis*, *Leucena leucocephala*, *Albizia chinensis* etc.). These species will provide fuel wood, fodder, timber and green manure on the home gardens, thus reducing pressure on existing cowdung and crop residues as fuel that could be used in crop fields to increase productivity.

Last, but not least, since home gardens encompass a number of components, an integrated research approach is needed for the uplift of home gardens. Linkages between research organizations, extension services and the farmers will ensure the development of the homestead gardening practices in Bangladesh even more.

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Table: 1. Size of homesteads and land ownership in Bangladesh

Type	All holdings	Holdings owning no land	Number of holdings owning lands								
			0.01-0.04 acre	0.05-0.49 acre	0.55-0.99 acre	1.00-2.49 acre	2.50-4.99 acre	5.00-7.49 acre	7.50- 14.99 acre	15.00- 24.99 acre	25 acres and above
All holdings	17828168	1814571	2029130	6143810	2153700	3318805	1458158	541231	292023	58202	18578
No homestead land	162229	63224	24891	39440	9817	15213	6227	2032	955	309	130
Homestead land but no cultivated land	5003042	1261587	1566894	1799196	122519	157626	59369	21483	11467	2145	782
Homestead and cultivated land up to 0.5 acre	51919779	302095	320488	3343724	746192	332168	98378	30405	14956	2715	865
Homestead and cultivated land 0.51-1.00 acre	2494606	96688	76741	5500708	902134	770353	65082	21356	9380	1642	558
Homestead and cultivated land >1.00 acre	4976326	90988	40132	410765	373054	2043445	1229115	465964	255262	51394	16242

Source: Anonymous, 1998a

Table 2: Characteristics of existing household gardens in selected areas of Bangladesh

<i>Indicator variables</i>	<i>Mohd. Pur (n=108)</i>	<i>Sripur (n=120)</i>	<i>Dumuria (n=143)</i>	<i>Tetulia (n=59)</i>	<i>M. Pur Sadar (n=156)</i>	<i>Teknaf (n=36)</i>	<i>Total (n=622)Me an</i>
Family size of the garden holders	5.9	5.6	5.2	5.2	5.9	6.0	5.6
Size of garden (decimal)	1.1	1.1	1.5	1.5	1.0	1.0	1.2
No. of var. of vegetables in the gardens	1.8	1.9	3.0	2.9	2.9	1.4	2.5
No. of Vit. A rich vegetable	1.2	1.2	1.1	1.7	2.0	0.4	1.5
Quantity of vegetable Production (kg)	6.2	8.6	7.9	6.6	0.3	0.8	4.9
Per capita vegetable consumption Per day (gm)	75	97	112	99	69	87	89
Frequency of consumption /child /7 days	1.3	1.4	2.0	2.2	2.0	1.2	1.2
Frequency of consumption /mother /7 days	1.3	1.8	2.0	1.9	1.9	1.2	1.8

Source: Anonymous, 1998b**Table 3: The source of seeds and seedlings for gardening in homestead in selected areas**

<i>Source of seeds /seedlings</i>	<i>Mohd. Pur</i>	<i>Sripur</i>	<i>Dumuria</i>	<i>Tetulia</i>	<i>M. Sadar</i>	<i>Teknaf</i>	<i>Average</i>
Own	70.3	54.1	41.1	42.2	19.9	81.3	43.3
Market	8.8	16.4	28.0	42.2	26.0	18.8	23.2
Neighbor	20.9	29.5	30.8	13.3	12.3	0.0	20.2
Others	-	-	-	2.2	41.8	-	13.3

Source: Anonymous, 1998b

Table 4: Households producing and selling regularly

<i>Item</i>	<i>Urban households (%)</i>	<i>Rural households (%)</i>
Livestock	10.98	9.74
Poultry	15.85	15.82
Milk and milk products	37.44	37.12
Meat	10.23	1.39
Eggs	23.68	29.99
Hides and skins	1.63	4.87
Bones, hoofs, horns, hairs	0.19	1.07

Source: Anonymous, 1998a**Table 5: Production and income from home garden in Tangail region**

<i>Vegetables</i>	<i>Average production (Kg) in each household during 1990-'91</i>	<i>Maximum production (Kg)</i>	<i>Production cost (Tk.) in each household during 1990-'91</i>	<i>Net income in each household during 1990-'91</i>
Vegetable arrangement I:				
Tomato-Okra-Indian Spinach				
Tomato	10	10 (1990-'91)	78.00	60.00
Okra	19	23 (1992)	45.00	122.00
Indian Spinach	33	33 (1990)	10.00	137.00
Vegetable arrangement II:				
Brinjal/capsicum seedling-capsicum / brinjal seedling				
Brinjal	09	18 (1992)	51.00	39.00
Capsicum seedlin	1550 pieces	1550 p. (1990)	15.00	105.00
Capsicum	3	3 (1990)	14.00	25.00
Brinjal seedling	2100 pieces	2100 p. (1990-'91)	10.00	35.00
Climbing type:				
Ribbed gourd	20	39 (1992)	40.00	200.00
Bean	7.5	146 (1991-'92)	20.000	44.00
Sweet gourd	12 pieces	16 p. (1991-'92)	5.00	100.00
Ash gourd	20 pieces	48 p. (1991)	30.00	125.00
Bottle gourd	20 pieces	20 p. (1990)	3.00	64.00
Ribbed Gourd	15	15 (1990)	15.00	68.00
Snake gourd	14	39 (1992)	10.00	91.00
Sponge gourd	10	63 (1992)	15.00	58.00
Cucumber	15	15 (1990)	10.00	73.00
Swamp Cabbage	15	15 (1990)	10.00	85.00
Minor vegetables				
Papaya	45	100 (1988)	40.00	180.00
Green Banana	-	84 p. (1991-'92)	10.00	74.00
Drumstick	104 pieces	104 p. (1990)	15.00	25
Shade loving plants (Spices)				
Garlic	18	18 (1990-'91)	24.00	66
Total	233.5 Kg 32 pieces gourd and sweet gourd 104 pieces Drumstick		470.00	1776.00

Source: Anonymous, 1993b

Table 6: Approximate amount (00) of nutrients from a homegarden in different periods of a year

<i>Periods</i>	<i>Vegetables</i>	<i>Calorie (K.Cal)</i>	<i>Calcium (mg)</i>	<i>Phosphorus (mg)</i>	<i>Iron (mg)</i>	<i>Vitamin A (microgram)</i>	<i>Thiamin (mg)</i>	<i>Riboflavin (mg)</i>	<i>Niacin (mg)</i>	<i>Vitamin C (mg)</i>
Jan. – Feb.	Tomato	23	20	36	1.8	192	0.07	0.01	0.4	31
Jan. – Apr.	Gourd	18	30	15	1.1	0	0.05	0.02	0.3	0
May – June	Ribbed Gourd	25.2	36.4	28	0.4	134.4	0.06	0.08	0.4	0
May – Sept.	Teasel Gourd	104	60	84	9.2	3240	0.1	0.36	12.0	-
June	Drum Stick	18	21	77	3.7	77	0.04	0.05	0.14	84
June – July	Ribbed Gourd	25.5	27	39	0.8	49.5	-	0.02	0.3	7.5
June – Sept.	Okra	66.5	125.4	106.4	30.4	98.8	0.13	0.02	1.14	24.7
June – Oct.	Ash Gourd	20	60	40	1.6	0	0.12	0.02	0.8	2
July – Aug.	Cucumber	19.5	15	37.5	2.3	0	0.05	0	0.3	10.50
July – Sept.	Sweet Gourd	30	12	39	0.8	60	0.07	0.05	0.6	2.4
Sept. – Oct.	Indian Spinach	-	192	-	15.0	190	-	-	-	76
Oct. – Jan.	Papaya	121.5	126	180	4.1	0	0.05	0.05	0.5	54
Nov. – Mar.	Bean	118.5	37.5	120	2.0	25.5	0.26	0.14	0	20.3
Dec. – Mar.	Brinjal	21.6	16.2	42.3	0.81	66.6	0.04	0.10	0.81	10.1
Total		611.30	778.5	841.2	46.65	4133.8	1.04	1.10	6.89	323.2

Source: Anonymous, 1993b

Table 7: Daily requirements of nutrients for an adult and available amount from home garden per annum

<i>Nutrients</i>	<i>Male</i>	<i>Female</i>	<i>Available from homegarden</i>
Calorie (K.cal.)	3000	2000	611.30
Calcium (mg)	500	500	778.5
Phosphorus (mg)	1013	1013	841.2
Iron (mg)	10	28	46.65
Vitamin A (microgram)	750	750	4133.8
Thiamin (mg)	1.4	1.4	1.04
Riboflavin (mg)	1.5	1.5	1.10
Niacin (mg)	15	15	6.89
Vitamin C (mg)	30	30	323.2